10th Class 2015

Biology	Group-I	Paper-II
Time: 2.45 Hours	(Subjective Type)	Max. Marks: 63

Part-I

2. Write short answers to any Six (6) questions: 12

(i) Differentiate between Breathing and Respiration.

Ans Taking in oxygen and giving out of carbon dioxide is termed as gaseous exchange.

Respiration involves the mechanical and bio-chemical processes whereas breathing is the mechanical 'or' physical process of exchange of gases.

(ii) Write the structure and function of Alveolus.

Ans The alveoli form the respiratory surface in human body. Each alveolus is a sac-like structure lived by a single layer of epithelial cells. It is bound on the outside by a network of capillaries.

(iii) Give two bad effects of smoking.

Ans The two bad effects of smoking are as follows:

1. Smoking causes the lung cancer.
2. Smoking also affects the social life of a person.

(iv) Differentiate between Osmoregulation and Thermoregulation.

Ans Osmoregulation is the maintenance of the amounts of water and salts in body fluids, (*i.e.,* blood and tissue fluids), whereas the maintenance of internal body temperature is called thermoregulation.

(v) Write the names of different parts of human Urinary System.

Ans The human urinary system is formed of one pair of kidneys, a pair of uretors, a urinary bladder.

(vi) When Kidneys form Hypotonic and Hypertonic Urine?

Ans When there is excess water in body fluids, kidneys form dilute (hypertonic) urine. For this purpose, kidneys filter more water from glomerular capillaries into Bowman's capsule. Similarly, less water is reabsorbed and abundant dilute urine is produced. It brings down the volume of body fluids to normal.

When there is shortage of water in body fluids, kidneys filter less water from glomerular capillaries and the rate of reabsorption produces small amount of concentrated (hypertonic) urine. It increases the volume of body fluids to normal. This whole process is under hormonal control.

(vii) Define Stimuli and Response.

Ans Touch, light, etc. are factors that can bring about certain responses in living organisms. These factors are called stimuli.

On receiving the message from coordinators, the effector performs action. This action is called response.

(viii) How brain is protected?

Ans Brain is situated inside a bony cranium (part of skull). Inside cranium, brain is covered by three layers called meninges. Meninges protect brain and also provide nutrients and oxygen to brain tissue through their capillaries.

(ix) What is Paralysis? Write its symptoms.

Ans Paralysis is the complete loss of function by one or more muscle groups. It is often, caused by damage to the central nervous system.

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3. Write short answers any Five (5) questions: 10

(i) Write two functions of bones.

Ans Bones perform the following two functions:

1. Bones move, support and protect the various parts of body.
2. Bones produce red blood cells and store minerals.

(ii) Describe the role of Ligaments.

Ans Ligaments are strong but flexible bands of connective tissues. They join one bone to another at joints. They prevent dislocation of bones at joints.

(iii) What is Rheumatoid Arthritis? Write its symptoms.

Ans It involves the inflammation of the membranes at joints. Its symptoms include fatigue, low-grade fever, pain and stiffness in joints.

(iv) What is Embryo? Write its parts.

Ans Embryo is actually an immature plant. It consists of a radicle, a plumule and one or two cotyledons (seed leaves). The radicle of embryo develops into new root while the plumule develops into new shoot.

The embryonic stem above the point of attachment of cotyledon(s) is called epicotyl. The embryonic stem below the point of attachment is hypocotyl.

(v) Differentiate between Internal and External Fertilization.

Ans In external fertilization, egg cells are fertilized outside of body. External fertilization occurs mostly in acquatic environment.

In internal fertilization, egg cells are fertilized within the reproductive tract of female. It occurs in reptiles, birds and mammals.

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(vi) What are discontinuous variations? Give examples.

Ans Discontinuous variations show distinct phenotypes. The phenotypes of such variations cannot be measured. The individuals of a population either have distinct phenotypes, which can be easily distinguished from each other. Blood groups are a good example of such variations.

(vii) What are hinge joints? Write two examples.

Ans Hinge joints are the type of moveable joints. They move back and forth like the hinge on a door and allow movement in one plane only. The knee and elbow are hinge joints.

(viii) What is the Theory of Special Creation?

Ans The anti-evolution ideas support that all living things had been created in their current form only a few thousand years ago. It is known as the "Theory of special creation."

4. Write short answers to any Five (5) questions: 10

(i) Write a short note on Ecological Pyramids.

Ans In 1927, Charles Elton developed the concept of ecological pyramids. He noted that the animals present at the beginning of food chain are abundant in number while the animals present at the end of food chain are fewer in number. It can be defined as: "A representation of the number of individuals or amount of biomass or energy present in various trophic levels of a food chain."

(ii) Differentiate between Nitrification and Denitrification.

Ans In nitrogen cycle, after the formation of ammonia, it is converted into nitrites and nitrates. It is called nitrification and is done by nitrifying bacteria.

Denitrification is a biological process in which nitrates and nitrites are reduced to nitrogen gas by denitrifying bacteria. By this process, nitrogen is returned to atmosphere.

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(iii) Define Competition and give example.

Ans In ecosystems, the natural resources *e.g.,* nutrients, space, etc. are usually in short supply. So there is a competition among the organisms of ecosystem for the utilization of resources. For example, plants show competition for space, light, water and minerals.

(iv) Write any two applications of Fermentation.

Ans **1- Cereal products:**

Bread is the commonest type of fermented cereal product. Wheat dough is fermented by S. cerevisiae along with some lactic acid bacteria.

2- Fruit and vegetable products:

Fermentation is usually used, along with salt and acid, to preserve pickle, fruits and vegetables.

(v) Write any two achievements of Genetic Engineering.

Ans

1. Beta-endorphin, a pain killer produced by the brain, has also been produced by genetic engineering techniques.
2. Genetic engineering techniques can be used to cure blood diseases like thalassemia and sickle-cell anaemia, which result from defects in single genes. Normal genes could be transferred into the bone marrow.

(vi) What do you mean by Single Cell Protein?

Ans Single cell protein (SCP) refers to the protein content extracted from pure or mixed cultures of algae, yeasts, fungi or bacteria.

(vii) Define Sedatives and give examples.

Ans Sedatives induce sedation by reducing irritability or excitement *e.g.*, diazepam.

(viii) Write a short note on Marijuana.

Ans Marijuana is a hallucinogen, which is smoked. It is obtained from the flowers, stems and leaves of the marijuana plant. Small doses of marijuana result in a feeling of well-being that lasts two to three hours. High doses increase heart rate. It also affects the production of sperms in men and also weakens the short-term memory.

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Part-II

NOTE: Attempt any Three (3) questions.

Q.5.(a) How gaseous exchange takes place in plant leaves? (4)

Ans **Gaseous exchange in plants:**

Plants have no organs or systems for the exchange of gases with the environment. Every cell of the plant body exchanges gases with the environment by its own.

Stomata and air spaces:

The leaves and young stems have stomata in their epidermis. The gaseous exchange occurs through these stomata. The inner cells of leaves (mesophyll) and stems also have air spaces among them, which help in the exchange of gases.

Two situations of leaf cells

(1) Daytime situation:

During the daytime, when the mesophyll cells of leaves are carrying out photosynthesis and respiration side by side, the oxygen produced in photosynthesis is utilized in cellular respiration. Similarly, the carbon dioxide produced during cellular respiration is utilized in photosynthesis.

(2) Night-time situation:

During night, when there is no photosynthesis occurring, the leaf cells get oxygen from the environment and release carbon dioxide through stomata.

(b) How plants remove extra Carbon dioxide, Oxygen and Water? (3)

Ans **Removal of extra carbon dioxide and oxygen:**

In daytime, the carbon dioxide produced during cellular respiration is utilized in photosynthesis and it is not a waste product. At night, it is surplus because there is no utilization of carbon dioxide. It is removed from the tissue cells by diffusion.

(i) Removal through stomata:

In leaves and young stems, carbon dioxide escapes out through stomata.

(ii) Removal through root hairs:

In young roots, carbon dioxide diffuses through the general root surface, especially through root hairs.

Removal of extra water:

Plants obtain water from soil and it is also produced in the body during cellular respiration. Plants store large amount of water in their cells of turgidity. Extra water is removed from plant body by transpiration.

Removal through guttation:

At night, transpiration usually does not occur because most plants have their stomata closed. If there is a high water content in soil, water enters the roots and is accumulated in xylem vessels. Some plants such as grasses force this water through special pores, present at leaf tips or edges, and form drops. The appearance of drops of water on the tips or edges of leaves is called guttation.

Q.6.(a) Describe the contributions of Ibnal Hatham in Optics. (4)

Ans **Ibnal Hatham:** (965 – 1039)

Ibnal Hatham was an Arab scientist. He wrote "Book of Optics" which has been ranked alongside a book of Isaac Newton. It is one of the most influential books ever written in the history of Physics.

Contributions in Optics:

Ibnal Hatham made significant contributions to the principles of eye and vision. He is regarded as the father of optics. His "Book of Optics" correctly explained and proved the modern theory of vision. He discussed the topics of medicine and eye surgery in his book. He made several improvements to eye surgery and accurately described the process of sight, the structure of eye, image formation in eye and visual system. Ibnal Hatham also described the principle of pinhole camera.

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(b) Describe the structure of Bone. (3)

Ans **Bone:**

Bone is the hardest connective tissue in body. Bones not only move, support and protect the various parts of body but also produce red and white blood cells and store minerals.

Structure of bone:

(i) Compact bone:

The hard outer layer of a bone is called compact bone.

(ii) Spongy bone:

The interior of bone is soft and porous. It is called spongy bone. Sponge bone contains blood vessels and bone marrow

(iii) Osteocytes:

The bones contain different types of cell. The mature bone cells are called osteocytes.

Q.7.(a) Describe the structure of Flower. (4)

Ans For Answer see Paper 2013 (Group-I), Q.7.(a).

(b) What is Pollination? Discuss its kinds. (3)

Ans **Pollination:**

Pollination is defined as the transfer of pollen grains from flower's anther to stigma.

Kinds of pollination:

Two kinds of pollination are given as under:

(i) Self-Pollination:

Self-pollination is defined as the transfer of pollen grains from the anther to the stigma of the same flower or other flower of the same plant.

(ii) Cross pollination:

Cross pollination is the transfer of pollen grains from the flower on one plant to the flower on other plant of the same species. Cross pollination is brought about by various agencies like wind, water, bees, birds, bats and other animals including man.

Q.8.(a) State Mendel's Law of Segregation. Explain it with the help of crosses and example. (4)

Ans **Mendel's law of segregation:**

In each organism, the genes are present in pairs. During gamete formation, the genes of each pair segregate from each other and each gamete receives one gene from the pair. When the gametes of male and female parents unite, the resulting offspring again gets the genes in pairs. These conclusions were called the law of segregation.

Crosses:

Mendel studied the inheritance of seed shape first. For this purpose, he crossed two plants having one contrasting trait *i.e.,* seed shape. A cross in which only

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one trait is studied at a time, is called as a monohybrid cross.

Example 1:

Mendel crossed a true-breeding round-seeded plant with a true-breeding wrinkled-seeded plant. All resulting seeds of the next generation were round. Mendel declared the trait "round seeds" as dominant, while "wrinkled seeds" as recessive. The following year, Mendel planted these seeds and allowed the new plants to self-fertilize. As a result, he got 7324 seeds: 5474 round and 1850 wrinkled (3 round: 1 wrinkled).

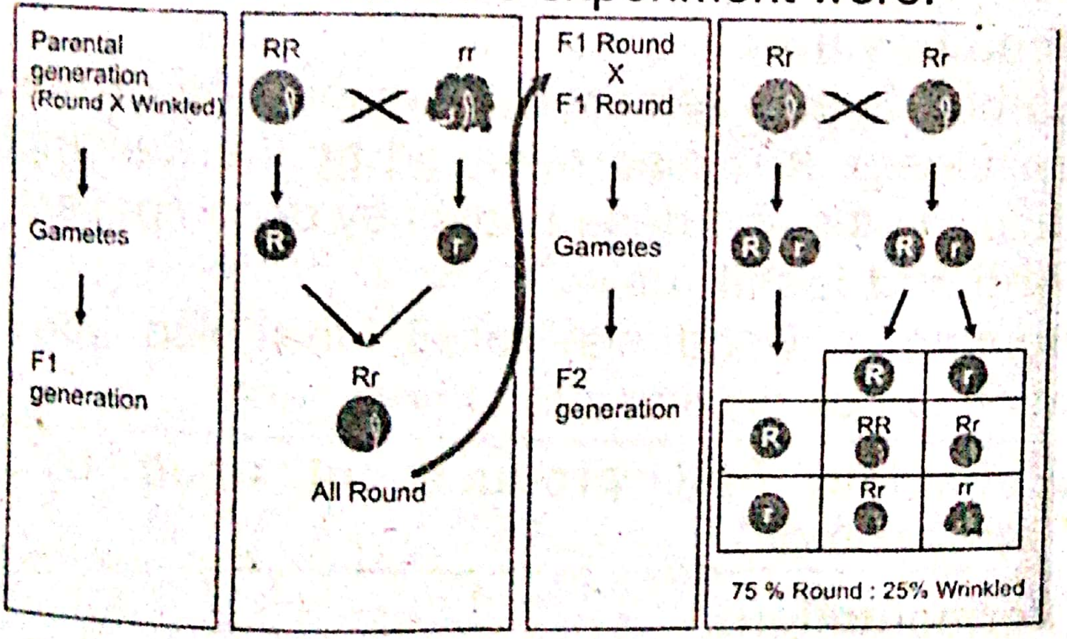
Example 2:

The parental generation is denoted as P_1 generation. The offspring of P_1 generation are F_1 generation (first filial). The cross of F_1 generation produces F_2 generation (second filial).

Similarly, when "true-breeding" tall plants were crossed with "true-breeding" short plants, all offspring of F_1 were tall plants, *i.e.*, tallness was a dominant trait. When members of F_1 generation were self-fertilized, Mendel got the ratio of tall to short plants in F_2 as 3 : 1.

Results:

The results of Mendel's experiment were:


Parental generation (Round X Winkled)
Gametes
F1 generation
RR
rr
R
r
Rr
All Round
F1 Round X F1 Round
Gametes
F2 generation
Rr
Rr
R
r
R
r
RR
Rr
Rr
rr
75 % Round : 25% Wrinkled

(b) Explain Carbon Cycle. (3)

Ans **Definition:**

Carbon cycle is a perfect cycle in the sense that carbon is returned to atmosphere as soon as it is removed. Carbon atom is the principal building block of many kinds of biomolecules. Carbon is found as graphite and diamond in nature. It also occurs as carbon dioxide in atmosphere.

Sources of carbon:

Major source of carbon for the living world is carbon dioxide present in atmosphere and water. Fossil fuels like peat, coal, natural gas and petroleum also contain carbon. Carbonates of Earth's crust also give rise to carbon dioxide.

(i) Photosynthesis:

The major process that brings carbon from atmosphere or water into living world is photosynthesis. Producers take in carbon dioxide from atmosphere and convert it into organic compounds. In this way, carbon becomes a part of the body of producers. This carbon enters food chains and is passed to herbivores, carnivores and decomposers.

(ii) Respiration:

Carbon dioxide is released back to environment by respiration of producers and consumers.

(iii) Decomposition:

Carbon is also released by respiration of producers and consumers. It is also released by the decomposition of organic wastes and dead bodies by decomposers.

(iv) Wood and fossil fuels:

Burning of wood and fossil fuels also adds large amount of carbon dioxide into atmosphere.

Q.9.(a) Explain four products obtained by using Fermentation. (4)

Ans **Fermentation:**

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In biotechnology, the term "fermentation" means the production of any product by the mass culture of micro-organisms.

(i) Cereal products:

Bread is the commonest type of fermented cereal product. Wheat dough is fermented by S. cerevisiae along with some lactic acid bacteria.

(ii) Dairy products:

Cheese and yogurt are important fermentation products. Cheese is formed when a milk protein is coagulated. This happens when the acid produced by lactic acid bacteria reacts with milk protein. Yogurt is made from milk by different lactic acid bacteria.

(iii) Fruit and vegetable products:

Fermentation is usually used, along with salt and acid, to preserve pickle, fruits and vegetables.

(iv) Beverage products:

Beer is produced from cereal grains which have been malted, dried and ground into fine powder. Fermentation of the powder is done by yeast. This process breaks the glucose present in powder into pyruvic acid and then into ethanol. Grapes can be directly fermented by yeasts to wine.

(b) Describe Drug Addiction and associated problems. (3)

Ans For Answer see Paper 2013 (Group-II), Q.9.(b).

Part-III

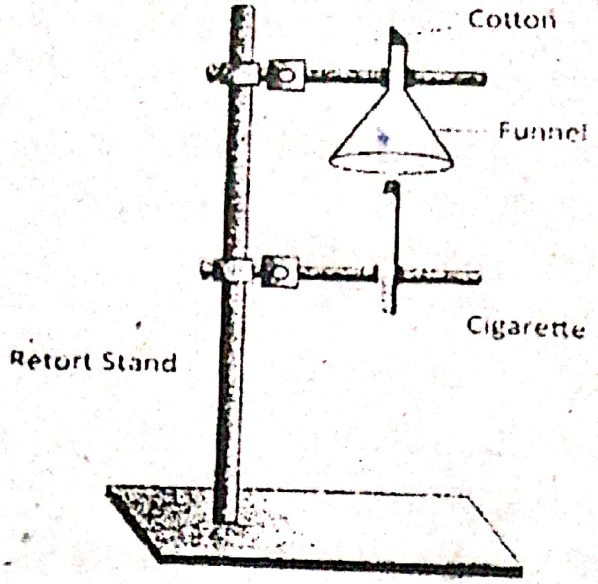
(Practical Part)

A-(i) Write down the procedure to show the presence of Tar in Cigarette smoke. Draw the diagram. (3)

Ans **Materials required:**

Cigarette without filter, stand, matchbox, funnel, white tissue paper, cotton, pictures of lungs of smoker and a non-smoker.

Procedure:



1. We fix a lighted cigarette in a stand as shown in the figure.
2. We fix a funnel in stand over the cigarette.
3. Now we close the upper end of the stem of funnel with cotton.

Observation:

When the funnel is rubbed with white cotton or tissue paper, a brown colour sticky material will be attached to it.

(ii) What are the effects of Tar on Lungs. (2)

Ans

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1. Tar is sticky material which deposits along the walls of the wind pipe due to which the cilia become stiff.
2. It destroys lungs cells.
3. It deposits along the walls of alveoli and stops exchange of gases.

B-(i) Write down the procedure to demonstrate the effect of 12 volt D.C. Current on skin muscle of Frog. (3)

Ans **Materials required:**

Pithed frog, dissection box, methylene blue solution, Ringer's solution, Petri dish, 12 V D.C battery, two copper wires, dropper, vaseline.

Procedure:

1. Fill a Petri dish with Ringer's solution and add a few drops of methylene blue solution in it.
2. Put the shin muscle of frog in the Petri dish.
3. Connect the wire of negative terminal of battery to one end of shin muscle. On the other end of muscle, connect another wire.
4. Cover the Petri dish and seal it by using vaseline (to avoid entry of air).
5. Connect the free end of wire with the positive terminal of battery.
6. Repeat it for a few minutes.

Observation:

The Gastrocnemius muscle contracts when an electrical stimulus is applied directly to it.

Conclusion:

The contraction and relaxation of the muscles or muscle twitch is due to the electrical impulses.

In living organisms, muscle contracts by the action of a nerve impulse. Experimentally, a muscle can be stimulated to contract by applying an electrical stimulus directly to the muscle to the attached nerve.

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(ii) What is meant by Antagonistic Muscles? Give an example. (2)

Ans These body muscles always act opposite to each other. When one muscle contracts, the other relaxes. This mode of working is called antagonism.

C-(i) Write down the procedure to investigate the role of Bacteria in the fermentation of milk. (3)

Ans **Materials required:**

One cup of milk, paper cups, one tablespoon yogurt, spoon, stove/Bunsen burner, match stick, beaker.

Procedure:

1. Heat the fresh milk slowly to 85°C and keep it at this temperature for 2 minutes (to kill micro-organisms).
2. Cool the milk to 40°C slowly.
3. Put a spoon of yogurt in a cup.
4. Fill the cup with milk and stir.
5. Cover the cup with cling wrap or any other way and place it in an oven or warm place at 40°C.

Observation:

After fermentation, milk becomes coagulated due to lactic acid by enzymes which are produced by lactic acid bacteria.

Conclusion:

Lactic acid bacteria *e.g.,* Lactobacillus, ferment the lactose in the milk and form yogurt.

(ii) What is Pasteurization? (2)

Ans It is the process by which the bacteria of the milk are killed to safe it and the taste of milk is not affected. Milk is pasteurized by heating it at 72°C for 30 seconds. This method of saving milk is called pasteurization.